

CLAIMS

What is claimed is:

1. A controlled-release composition for topical application to a substrate, said composition comprising:
 - an oil-in-water emulsion that is substantially free of lipophilic solvent and formed by mechanical inversion of a water-in-oil emulsion comprising a silicone component, a surfactant, and water; and
 - an active agent incorporated into said oil-in-water emulsion.
2. A controlled-release composition as set forth in claim 1 further comprising a dispersing agent for dispersing said active agent.
3. A controlled-release composition as set forth in claim 2 wherein said dispersing agent comprises a silicone-based surfactant different from said surfactant.
4. A controlled-release composition as set forth in claim 2 wherein said dispersing agent is selected from the group of nonionic surfactants, anionic surfactants, ethers, esters, glycols, and combinations thereof.
5. A controlled-release composition as set forth in claim 2 wherein said active agent is in powder form or crystalline form.
6. A controlled-release composition as set forth in claim 5 wherein said dispersing agent encapsulates said active agent.
7. A controlled-release composition as set forth in claim 1 wherein said active agent is in liquid or viscous form.
8. A controlled-release composition as set forth in claim 1 wherein said silicone component is selected from the group consisting of a silicone gum, a silicone rubber, a silicone elastomer, a silicone resin, high molecular weight silicones, and mixtures thereof.
9. A controlled-release composition as set forth in claim 1 wherein said silicone component comprises a pressure sensitive adhesive.
10. A controlled-release composition as set forth in claim 9 wherein said pressure sensitive adhesive comprises the reaction product of;
 - a hydroxy endblocked polydimethylsiloxane polymer, and

a hydroxy functional silicate resin.

11. A controlled-release composition as set forth in claim 10 wherein said hydroxy functional silicate resin is further defined as a trimethylsiloxy and hydroxy endblocked silicate resin.

12. A controlled-release composition as set forth in claim 1 wherein said active agent comprises a lipophilic drug.

13. A controlled-release composition as set forth in claim 1 wherein said active agent comprises a hydrophilic drug.

14. A controlled-release composition as set forth in claim 1 wherein said silicone component and said surfactant are in a homogenous oil phase.

15. A controlled-release composition as set forth in claim 1 further comprising an excipient.

16. A controlled-release composition as set forth in claim 15 wherein said excipient comprises a thickening agent for stabilizing said active agent and said oil-in-water emulsion.

17. A controlled-release composition as set forth in claim 16 wherein said thickening agent comprises at least one of polyacrylic acids, cellulose derivatives, polyvinyl alcohol, polyvinylpyrrolidone, polysaccharides, acrylamide copolymers, biological polymers and derivatives, butylene copolymers, carbohydrates, carborers, hydrophilic colloids and derivatives including salts and gums, polyacrylates and acrylate copolymers, synthetic polymers including salts, silica, calcium carbonates which can be untreated or treated with stearate or stearic acid, reinforcing silicas such as fumed silicas, precipitated silicas, and hydrophobed silicas, crushed quartz, ground quartz, alumina, aluminum hydroxide, titanium dioxide, diatomaceous earth, iron oxide, carbon black, and graphite, and resinous materials including silicone and organics.

18. A method as set forth in claim 1 wherein the oil-in-water emulsion has a solids content of from 25 to 85 parts by weight based on 100 parts by weight of the oil-in-water emulsion.

19. A method of delivering an active agent to a substrate, said method comprising the steps of:

providing an oil-in-water emulsion that is substantially free of lipophilic solvent and comprises a silicone-component, a surfactant, and water; and

incorporating the active agent into the oil-in-water emulsion for delivery of the active agent to the substrate upon application of the oil-in-water emulsion to the substrate.

20. A method as set forth in claim 19 further comprising the step of encapsulating the active agent in a dispersing agent prior to incorporation of the active agent into the oil-in-water emulsion.

21. A method as set forth in claim 20 wherein the dispersing agent allows a controlled rate of delivery of the active agent to the substrate.

22. A method as set forth in claim 20 further comprising the step of applying the oil-in-water emulsion to the substrate to deliver the encapsulated active agent to the substrate.

23. A method as set forth in claim 19 further comprising the step of combining the active agent with a dispersing agent to form a dispersion prior to incorporation of the active agent into the oil-in-water emulsion.

24. A method as set forth in claim 19 wherein the step of providing the oil-in-water emulsion comprises the step of forming a homogeneous oil phase containing the silicone-component.

25. A method as set forth in claim 24 wherein the step of incorporating the active agent into the oil-in-water emulsion is further defined as incorporating the active agent into the homogenous oil phase.

26. A method as set forth in claim 19 wherein the step of incorporating the active agent into the oil-in-water emulsion is further defined as incorporating the active agent along with water.

27. A method as set forth in claim 19 wherein the step of providing the oil-in-water emulsion further comprises the step of mechanically-inverting the water-in-oil emulsion into the oil-in-water emulsion.

28. A method as set forth in claim 19 wherein the silicone component is selected from the group consisting of a silicone gum, a silicone rubber, a silicone elastomer, a silicone resin, high molecular weight silicones, and mixtures thereof.

29. A method as set forth in claim 19 wherein the silicone component comprises a pressure sensitive adhesive.

30. A method as set forth in claim 19 wherein the active agent comprises a lipophilic drug.

31. A method as set forth in claim 19 wherein the active agent comprises a hydrophilic drug.

32. A method as set forth in claim 19 further comprising the step of applying the oil-in-water emulsion to the substrate to deliver the active agent to the substrate.

33. A method as set forth in claim 32 wherein the substrate is skin and the step of applying the oil-in-water emulsion to the substrate is further defined as applying the oil-in-water emulsion to the skin to deliver the active agent to the skin.

34. A method as set forth in claim 32 further comprising the step of depositing the oil-in-water emulsion on a transdermal patch prior to applying the oil-in-water emulsion to the substrate.

35. A method as set forth in claim 34 wherein the substrate is skin and the step of applying the oil-in-water emulsion to the substrate is further defined as applying the transdermal patch to the skin to deliver the active agent to the skin.

36. A method as set forth in claim 19 further comprising the step of incorporating an excipient into the oil-in-water emulsion.

37. A method as set forth in claim 19 wherein the substrate comprises one of a biological surface, human body tissue, and animal body tissue.

38. A method as set forth in claim 19 wherein the substrate comprises flora.

39. A method as set forth in claim 32 further comprising the step of exposing the substrate to air such that the water leaves the oil-in-water emulsion and a film is formed on the substrate.

40. A method as set forth in claim 39 wherein the substrate is skin and the film that is formed functions as at least one of a topical drug delivery system, a masking

system for skin protection in dermal treatments, a wound dressing or bandage for wounds, burns, acute and chronic wounds, a skin sealant, a skin protective film, a scar treatment, an exfoliation product, an antimicrobial agent such as silver ions, a hair remover products, a deodorizing film, an antiperspirant active and fragrance delivery system, an anti-wrinkle patch, a moisturizing mask, and wherein the film has benefits in topical therapies, wound care, surgical closure, scar care, underarm care, foot care, body and face skin care, cosmetics, make-up and foundations, insect repellents.

41. A method as set forth in claim 39 further comprising the step of transferring the film to a second substrate.